



Installation and Operation Manual

FD420CV VER HD

FD420CV VER HDSDI

42" High-Definition Widescreen LCD





Key Specifications

FD420CV VER		HD	HDSI
Display			
	Panel Technology	42" TFT Color LCD	42" TFT Color LCD
	Color	1.06 Billion Colors (10 Bit)	1.06 Billion Colors (10 Bit)
	Resolution/Refresh Rate	1920x1080	1920x1080
	Pixel Pitch	0.4845mm x 0.4845mm	0.4845mm x 0.4845mm
	Brightness	500 cd/m ²	500 cd/m ²
	Contrast Ratio		
	Viewing Angle	178° on Both Axis	178° on Both Axis
	Orientation		
	Response Time		
Power			
	Power Consumption		
	Inrush Current		
Environmental Conditions			
	Operating Temperatures		
	Humidity		
Dimensions			
	Bezel	40" (W) x 24.8" (H) x 3.0" (D)	40" (W) x 24.8" (H) x 3.0" (D)
	Display Size	36.5" (W) x 20.5" (H)	36.5" (W) x 20.5" (H)
	Weight	43 lbs.	43 lbs.
Features			
	Display Control	On Screen Display Menu, IR Included	On Screen Display Menu, IR Included
	User Manual		
	Materials	Aluminum	Aluminum
Certifications			
	EMI	RTCA DO-160G, Sec 21, Cat B	RTCA DO-160G, Sec 21, Cat B
	Crash Safety	JAR 25.561	JAR 25.561
	Rapid Decompression	RTCA DO-160G, Sec 4, Cat A1	RTCA DO-160G, Sec 4, Cat A1
	Dynamic Ball Impact	UL61965	UL61965





Connectivity

Connectivity FD420CV VER (XXXXX)	PMA	VGA	S-Video	Comp	DVI-D	HDMI	HDSDI	RS232	RS485	NTSC/PAL	
HD	*	*	*	*	*	2				*	
HDSDI	*	*	*	*	*	2	1		*	*	

COMP – N = NTSC & P = PAL (** Denotes both NTCS and PAL)





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General Information

The FD420CV VER HD and FD420CV VER HDSI are a 42" High-Definition Widescreen LCD which has features that allow installation in the smallest of mounting areas with the minimum of interface equipment. Built with retrofit aircraft integration in mind, this display can switch between five video input sources using an infrared remote.

Front View



Additional Information

The FD420CV VER HD/ VER HDSI utilizes a state of the art digital video decoding chipset for the analog video input. There are SIX video source inputs available. They are in order of picture quality: (2) HDMI (Hi-Def video, such as Blu-Ray DVD or PlayStation 3), (1) VGA (computer graphics like Moving Maps), (1) S-Video and (1) Composite Video (DVD, camera or VCR). Both NTSC and PAL formats are auto-detected.

The FD420CV VER (X) can also be connected to existing video switchers and use only a composite video input from a selector interface box. In this case, the IR remote will only be used to set up the screen after installation. E.g. adjust brightness, contrast, etc.

The LCD is protected with a .125" Lexan lens. The purpose of this lens is to prevent scratching of the LCD and reduce glare. The FD420CV VER (X) is made of all metal components. DO-160 testing has been completed and is available upon request.

Installation Instructions

All cabin entertainment equipment, such as the FD420CV VER (X), should be installed on a non-essential bus and have a dedicated circuit breaker. It is a requirement that a switch be installed in the cockpit so that the pilot can de-energize the entertainment system should it become necessary.

There are four – ¼ - 20 UNC mounting holes in the rear.

Mounting against the bulkhead or on a bracket: The unit can be mounted internal, external, or partially internal to the bulkhead. It is recommended that you leave about ¼ inch of space around the rear, top and bottom of the display for the exhaust fan to have circulating air. When mounting from inside the bulkhead it is possible to have only the LCD visible to the cabin. The unit will come on automatically upon power application and if using an external video source selection box the IR is not needed. If you are using the IR to change the video source selection, then you need to have the IR LED visible to the cabin.

Power

This is a **28VDC** monitor that requires 10.2 Amps of power to operate. The unit turns on automatically upon power application.

Wiring Suggestions

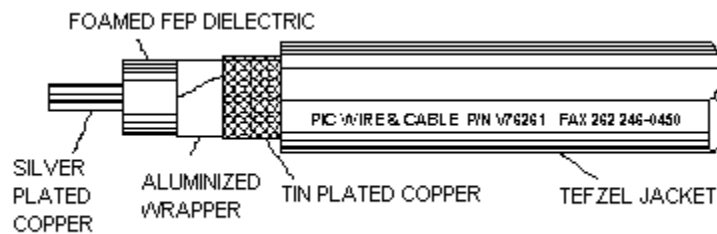
All shields should be grounded to the connector at the source, and floating at the display.

Avoid routing video wiring parallel to:

- AC wiring
- Strobe wiring
- DC motor supply cables
- Inverter cabling
- Or any other potential noise source.

S-Video/Composite and Audio Wiring

Recommended cable for s-video/composite and audio purposes is PIC 75 Ohm Coax, P/N V76261. This is a lightweight, flexible, and low signal loss cable which meets FAA flammability requirements of FAR 23.1359(d), FAR 25.853(a) and FAR 25.869(a)(4).

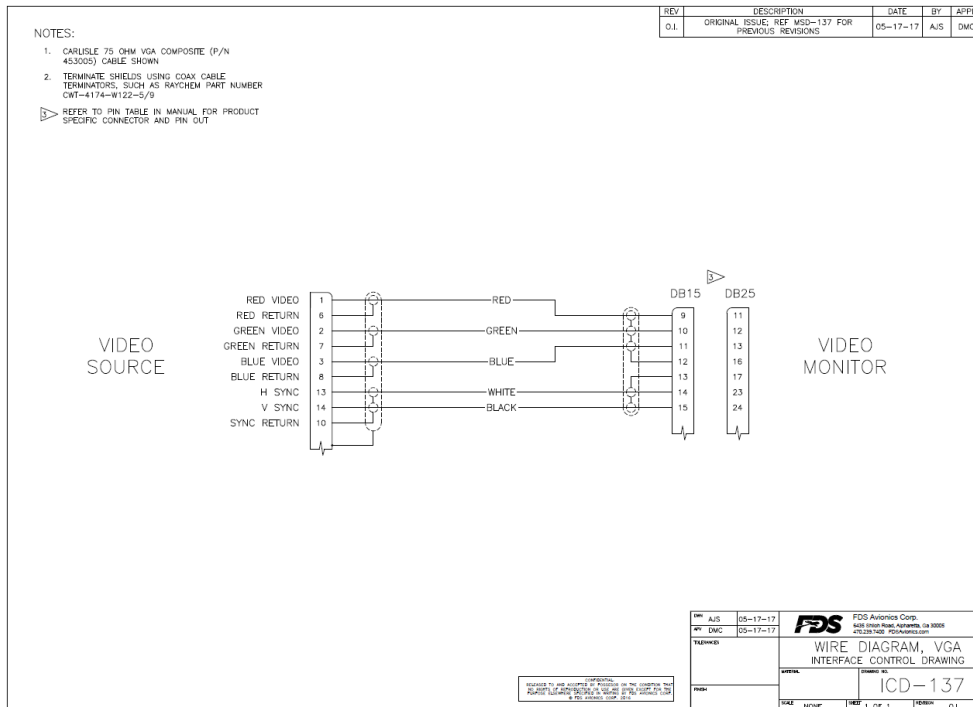


Similar aviation coaxial cable can be used from other vendors, as well.

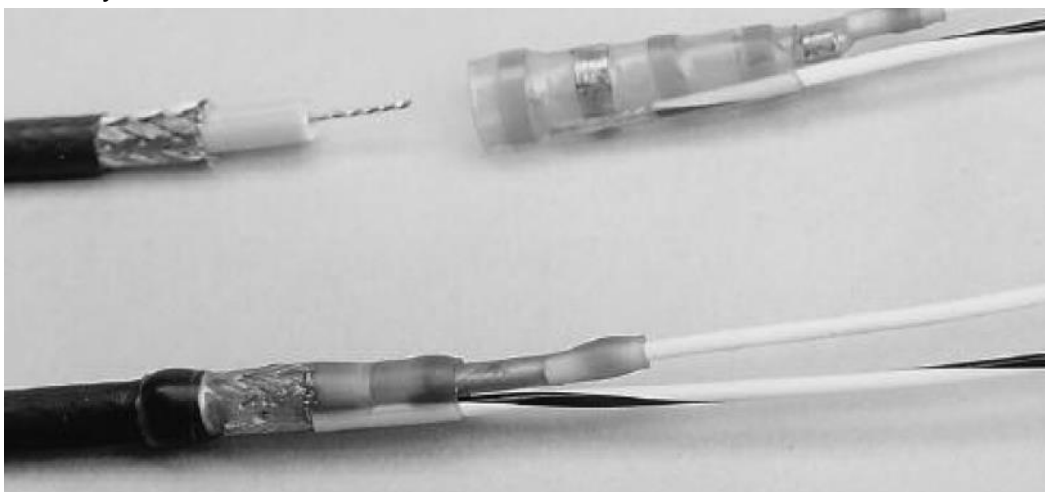
Some aircraft are prone to AC noise - we recommend adding to the composite source a 75 Ohm video isolation transformer such as Deerfield Laboratory, Inc. Part No. 162-1 (www.deerfieldlab.com, (650) 632-4090). In most cases this should be added to the video output of the source.

VGA Wiring

Recommended cable for VGA purpose is ECS P/N 453005. This is a single shielded cable containing 5 separate coaxial cables, color-coded to match the functions of the wires.



We recommend coax cables be terminated using solder sleeve coaxial cable terminators such as Raychem Part Number CWT-4174-W122-5/9.

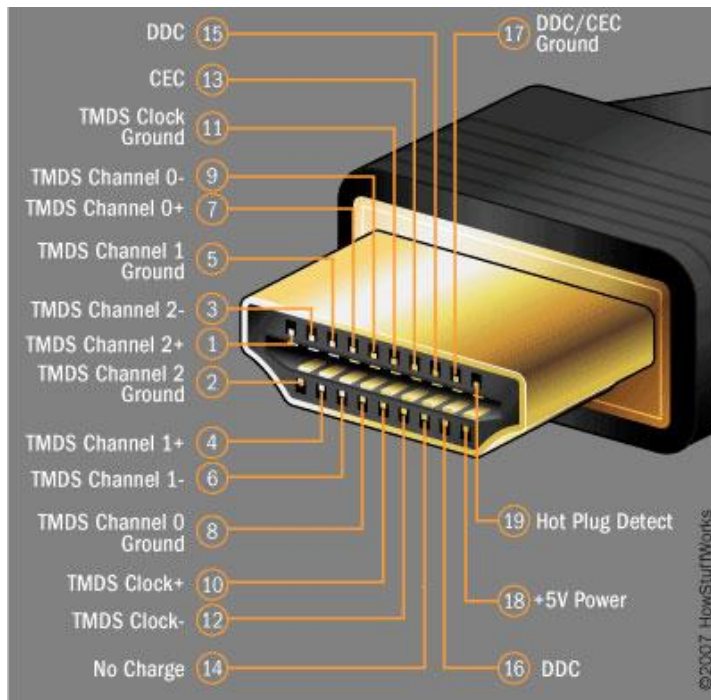


RS-485 Wiring

Shielded twisted-pair 22 AWG wire is recommended for RS-485 wiring.

HDMI

HDMI (High-Definition Multimedia Interface) defines the protocol and electrical specifications for the 19 signalling, pin-out, electrical, and mechanical requirements of cable and connectors used for transmitting High-Definition content. The Type A HDMI connector (shown below) has 19 pins with bandwidth to support all SDTV, EDTV, and HDTV modes. The plug's outside dimensions are 13.9 mm wide by 4.45 mm high.



ECS manufactures an HDMI cable that is terminated at the factory. It is ordered as part number 600-19786-XXX, where XXX is the length in inches for the desired cable.

Power and Ground Wiring

This is a 28VDC monitor that requires 10.2 Amps of power to operate. The rated current of the equipment and associated voltage drop should be taken into consideration when selecting wire gauge. To operate properly this monitor requires an input voltage of 25-32VDC allowing a 3 volt drop on the wire, this is equal to the sum of the voltage drop on the 28V power wire and the voltage drop on the ground or power return wire.

The following examples are based on an install with a 28VDC power system and a total of 50 feet of wire between the circuit breaker, monitor and ground.

Example 1: 20awg wire has 9.88 Ohms per 1000 feet, this equates to .494 Ohms for 50 feet. 6.6 Amps of current on .494 Ohms will drop 3.26 Volts. This exceeds the allowable voltage drop to operate this monitor.

Example 2: 10awg wire has 1.26 Ohms per 1000 feet, this equates to .063 Ohms for 50 feet. 6.6 Amps of current on .063 Ohms will drop 0.42 Volts. This is within the allowable range to operate this monitor.

Resistance of Wire Type M22759/16-** (** = Gauge)	
Gauge (AWG)	OHMS/1000'
20	9.88
16	4.81
12	2.02
10	1.26
8	.701

Some connector pins are only compatible with the smaller gauge wires. If multiple power pins are available, then all pins should be used. Multiple strands of wire may be run to the circuit breaker panel, or the multiple small gauge wires may be joined to a larger gauge wire for a single strand run to the circuit breaker panel. Also, use short heavy gauge wire and a clean tight connection for ground.

It is the installer's responsibility to understand the product's requirements to install the product in compliance with industry standards and safety.



RS-485 Control

RS-485 is a two-wire communication interface that allows an external device such as a computer or switching unit to control the monitor's functions remotely. Up to 99 monitors can be separately controlled by one unit.

Command sets for controlling the monitors with serial numbers starting w/ 12XXXXXXXX (10 digits) and above:

Commands								
	Length	CMD	Index		Set ID	Data		Check Sum
Power On	0x08	0x12	0x9C	0x00	0x00	0x01	0x01	0x48
Power Off	0x08	0x12	0x9C	0x00	0x00	0x00	0x01	0x49
HDMI 1	0x08	0x12	0x8E	0x00	0x00	0x00	0x01	0x57
HDMI 2	0x08	0x12	0x8E	0x00	0x00	0x01	0x01	0x56
DVI	0x08	0x12	0x8E	0x00	0x00	0x02	0x01	0x55
VGA	0x08	0x12	0x8E	0x00	0x00	0x03	0x01	0x54
S-Video	0x08	0x12	0x8E	0x00	0x00	0x04	0x01	0x53
Composite	0x08	0x12	0x8E	0x00	0x00	0x05	0x01	0x52
Auto	0x08	0x12	0x7E	0x00	0x00	0x00	0x01	0x67
Full Screen	0x08	0x12	0x7E	0x00	0x00	0x01	0x01	0x66
16:9	0x08	0x12	0x7E	0x00	0x00	0x02	0x01	0x65
4:3	0x08	0x12	0x7E	0x00	0x00	0x03	0x01	0x64
1:1	0x08	0x12	0x7E	0x00	0x00	0x04	0x01	0x63

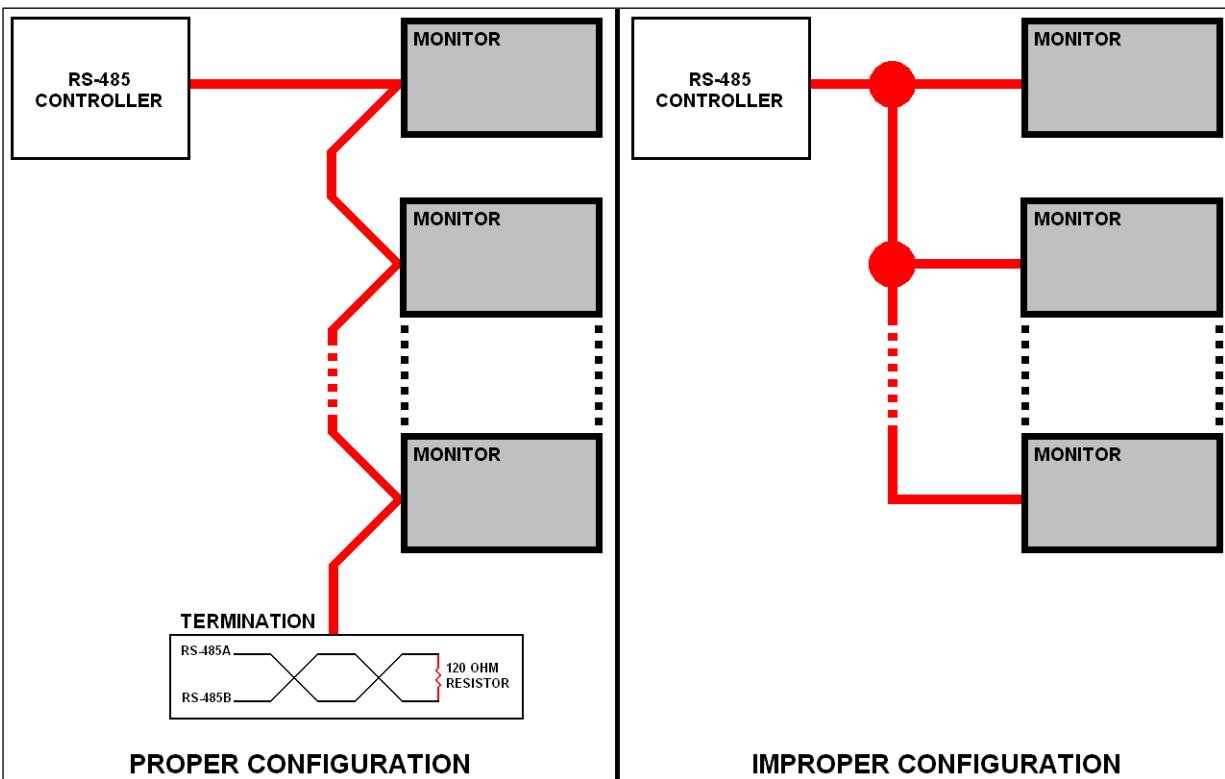
The RS-485 connector carries information between the Infrared received and the LCD controller board. Any connections to the RS-485 bus must be tolerant to the existing control signals. Devices connected to the RS-485 Bus should not send traffic that interferes with the existing RS-485 messages.



RS-485 Network

If there is more than one monitor connected to the aircraft's RS-485 controller system, then it is strongly recommended to connect the system in series, or daisy-chain, and terminate the twisted pairs with a 120 OHM resistor. This configuration improves the reliability of the system.

It is highly recommended to use 22 AWG twisted pairs for runs longer than 20 feet. Connect all RS-485A pins together, all RS-485B pins together.



Setting ID Numbers for Multiple Monitors:

When two or more monitors are installed on the same RS-485 Network, an ID number must be assigned to each monitor. To assign an ID:

- Press the menu button (either on the monitor or remote control)
- Navigate to the "image" tab
- Navigate down to "set ID"
- Press left or right to assign a number to the monitor
- Press menu twice to exit

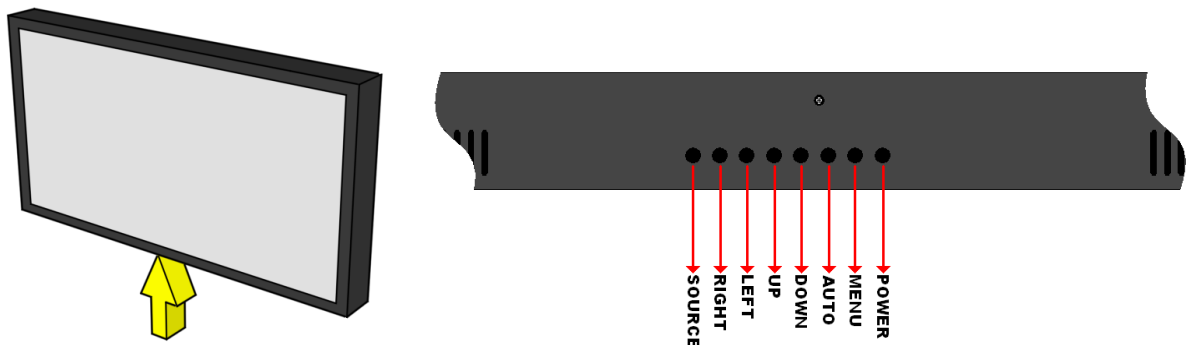
Operation Instructions

The FD420CV VER (X) is continuously on but can be de-energized by removing power from the entertainment system. No pilot or aircrew action is necessary during flight or ground operation.

The passengers will be able to change the video output from the FD420CV VER (X) using the video source button on the display, or remotely with the included IR remote. Point the IR remote at the top of the LCD to make changes.

When applying 28VDC power, the display will turn on and look for a valid input on the last known source. If no input is found, the display will go to standby mode. Pressing the Select button will select new video input.

Button Controls



Located at the bottom (center) of the FD420CV VER (X) are 8 buttons. Their functions are shown below:

BUTTON	FUNCTION	DESCRIPTION
1	Power	Toggles the power ON or Off. Also, wakes the display up from SLEEP mode.
2	Menu	Opens the MENU.
3	Auto	Auto-adjusts the display's size and position.
4	Down	Moves to the next selection in the menu.
5	Up	Moves to the previous selection in the menu.
6	Left	Decrease the selection's value in the menu.
7	Right	Increases the selection's value in the menu.
8	Source	Switches between sources coming into the display

Remote Control Buttons



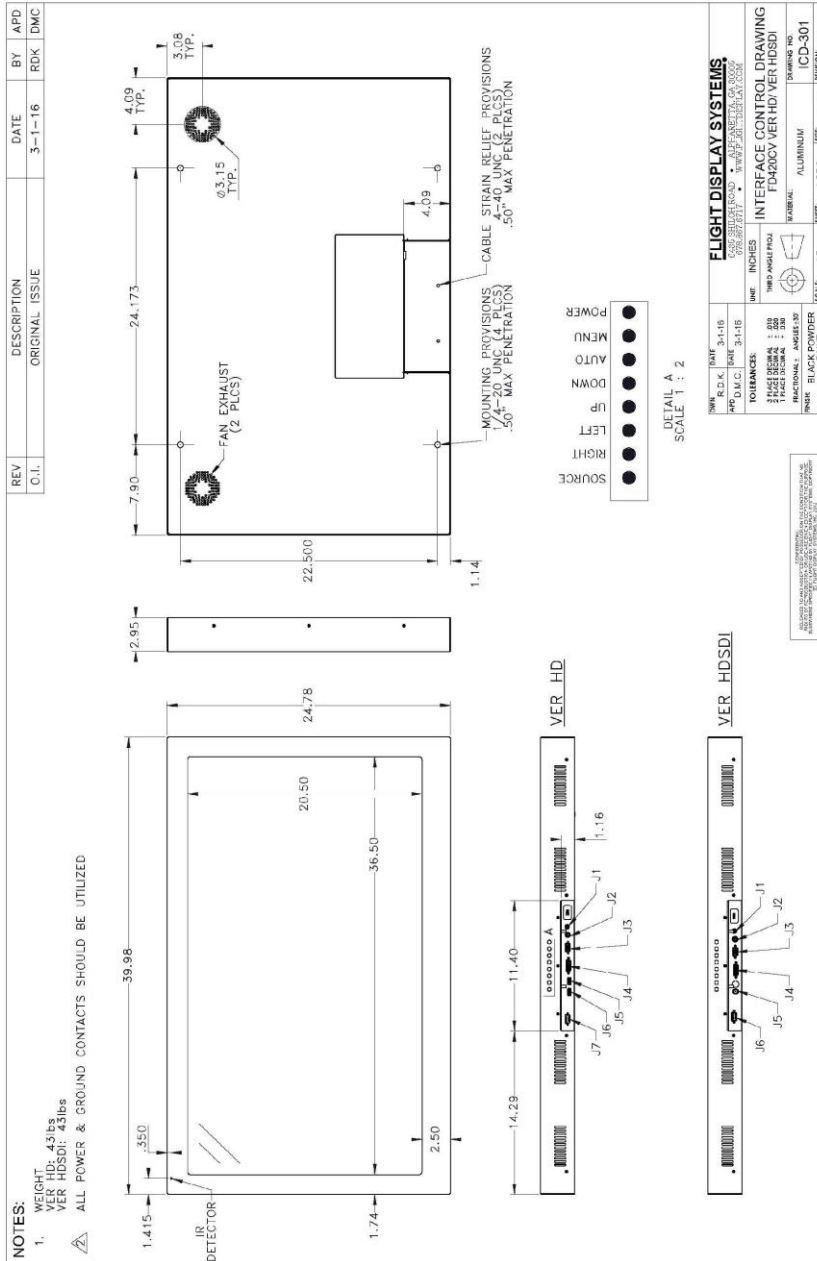
HD REMOTE



HDSDI REMOTE

BUTTON	DESCRIPTION
POWER	Toggles the power ON or OFF. Also, wakes the display up from SLEEP mode.
MENU	Opens the MENU.
DOWN	Moves to the next selection in the menu.
UP	Moves to the previous selection in the menu.
LEFT	Decrease the selection's value in the menu.
RIGHT	Increases the selection's value in the menu.
SOURCE	Switches between sources coming into the display.

Technical Drawing





Technical Drawing

<p>J1 (COMPOSITE VID – VER HD & HDSDI) CONNECTOR: RCA (PHONO) RECEPTACLE MATES WITH CONTACT: M30929/58-360 (SUPPLIED) INSTALL KIT: 750-DB15M</p> <table border="1"> <tr><td>CENTER</td><td>VIDEO SIGNAL</td></tr> <tr><td>SHELL</td><td>VIDEO RETURN</td></tr> </table>	CENTER	VIDEO SIGNAL	SHELL	VIDEO RETURN	<p>J2 (S-VIDEO – VER HD & HDSDI) CONNECTOR: 4-PIN MINI-DIN MATES WITH CONTACT: M30929/58-360 (NOT SUPPLIED)</p> <table border="1"> <tr><td>1</td><td>GND (Y)</td></tr> <tr><td>2</td><td>GND (C)</td></tr> <tr><td>3</td><td>LUMINANCE (Y)</td></tr> <tr><td>4</td><td>CHROMINANCE (C)</td></tr> </table>	1	GND (Y)	2	GND (C)	3	LUMINANCE (Y)	4	CHROMINANCE (C)	<p>J3 (VGA – VER HD & HDSDI) CONNECTOR: D-SUB HD15 FEMALE MATES WITH CONTACT: M30929/58-360 (SUPPLIED) INSTALL KIT: 750-DB15M</p> <table border="1"> <tr><td>1</td><td>RED VIDEO</td></tr> <tr><td>2</td><td>GREEN VIDEO</td></tr> <tr><td>3</td><td>BLUE VIDEO</td></tr> <tr><td>4</td><td>GND</td></tr> <tr><td>5</td><td>GND (DDC RETURN)</td></tr> <tr><td>6</td><td>RED GND</td></tr> <tr><td>7</td><td>GREEN GND</td></tr> <tr><td>8</td><td>BLUE GND</td></tr> <tr><td>9</td><td>N/C</td></tr> <tr><td>10</td><td>SYNC GND</td></tr> <tr><td>11</td><td>GND</td></tr> <tr><td>12</td><td>DDC DATA</td></tr> <tr><td>13</td><td>HORIZONTAL SYNC</td></tr> <tr><td>14</td><td>VERTICAL SYNC</td></tr> <tr><td>15</td><td>DDC CLOCK</td></tr> </table>	1	RED VIDEO	2	GREEN VIDEO	3	BLUE VIDEO	4	GND	5	GND (DDC RETURN)	6	RED GND	7	GREEN GND	8	BLUE GND	9	N/C	10	SYNC GND	11	GND	12	DDC DATA	13	HORIZONTAL SYNC	14	VERTICAL SYNC	15	DDC CLOCK	<p>J4 (DVI INPUT – VER HD & HDSDI) DVI-D RECEPTACLE STANDARD DVI-D PLUG (SUPPLIED) INSTALL KIT: 750-DVIM</p> <table border="1"> <tr><td>1</td><td>PINOUT</td></tr> <tr><td>2</td><td>TMDS DATA 2+</td></tr> <tr><td>3</td><td>TMDS DATA 2-</td></tr> <tr><td>4</td><td>TMDS DATA 2/14 SHIELD</td></tr> <tr><td>5</td><td>N/C</td></tr> <tr><td>6</td><td>DDC CLOCK</td></tr> <tr><td>7</td><td>DDC DATA</td></tr> <tr><td>8</td><td>N/C</td></tr> <tr><td>9</td><td>TMDS DATA 1-</td></tr> <tr><td>10</td><td>TMDS DATA 1+</td></tr> <tr><td>11</td><td>TMDS DATA 1/13 SHIELD</td></tr> <tr><td>12</td><td>N/C</td></tr> <tr><td>13</td><td>N/C</td></tr> <tr><td>14</td><td>+5V POWER</td></tr> <tr><td>15</td><td>GND</td></tr> <tr><td>16</td><td>HOT PLUG DETECT</td></tr> <tr><td>17</td><td>TMDS DATA 0-</td></tr> <tr><td>18</td><td>TMDS DATA 0+</td></tr> <tr><td>19</td><td>TMDS DATA 0/75 SHIELD</td></tr> <tr><td>20</td><td>N/C</td></tr> <tr><td>21</td><td>N/C</td></tr> <tr><td>22</td><td>TMDS DATA CLOCK SHIELD</td></tr> <tr><td>23</td><td>TMDS CLOCK+</td></tr> <tr><td>24</td><td>TMDS CLOCK-</td></tr> </table>	1	PINOUT	2	TMDS DATA 2+	3	TMDS DATA 2-	4	TMDS DATA 2/14 SHIELD	5	N/C	6	DDC CLOCK	7	DDC DATA	8	N/C	9	TMDS DATA 1-	10	TMDS DATA 1+	11	TMDS DATA 1/13 SHIELD	12	N/C	13	N/C	14	+5V POWER	15	GND	16	HOT PLUG DETECT	17	TMDS DATA 0-	18	TMDS DATA 0+	19	TMDS DATA 0/75 SHIELD	20	N/C	21	N/C	22	TMDS DATA CLOCK SHIELD	23	TMDS CLOCK+	24	TMDS CLOCK-
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18	+5V POWER																																																																																												
19	HOT PLUG DETECT																																																																																												
20	N/C																																																																																												
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FLIGHT DISPLAY SYSTEMS
 2800 WILSON BLVD. SUITE 100
 WILSON, CA 94094
 TEL: 415-947-1100 FAX: 415-947-1101
 WWW.FDSAVIONICS.COM

DATE: 3-1-15
 DRAWN: D.M.C.
 CHECKED: J.P.H.

INCHES
 THIRD ANGLE PROJ.
 UNIFORM
 ALUMINUM
 2 OF 2
 SHEET: 17
 SCALE: 1:1

INTERFACE CONTROL DRAWING
 FD420CV VER HD, VER HDSDI
 MATERIAL: ALUMINUM
 DRAWING NO: ICD-301
 REVISION: 01





Technical Support

Should you have any questions concerning this product or other FDS Avionics Corp. products, please contact our Product Support representatives at (470) 239-7421.

FDS Avionics Corp.
6435 Shiloh Road
Alpharetta, GA 30005
Phone: 470-239-7400
Fax: 470-239-4739
Email: sales@FDSAvionics.com

For further product information, technical data and sample wiring diagrams, please click on the **Dealers** section of our web site at www.FDSAvionics.com

Instructions for Continued Airworthiness

The FD420CV VER (X) is designed not to require regular general maintenance.





Limited Warranty

All FDS Avionics Corp. products are warranted to be free from material or manufacturing defects for a period of 24 months from the date of shipment for General Aviation customers or 12 months from the date of shipment for Government/Special Mission customers. Any material or repair workmanship for in warranty repair service will be specifically warranted for 90 days or the remainder of the original warranty period, whichever is longer. If the original warranty period has expired, the 90-day repair warranty is limited to the material and workmanship specific to the repair activity completed.

The following conditions are exclusions to warranty coverage:

1. Labor costs associated with installation, removal or reinstallation of any product.
2. Damage to or malfunction caused by any unauthorized alteration made to the product.
3. Resolving signal quality issues caused by externally generated noise introduced by aircraft electrical systems or other components connected to any FDS product.
4. Any malfunction caused by improper installation or connection to aircraft wiring, industry standard cabin management/inflight entertainment systems, or third party commercial equipment not specifically identified as compatible with FDS products.
5. Any malfunction caused by installation that does not conform to precautions associated with operating environments listed in the operating manual or consistent with industry best practices such as high temperature, adequate ventilation, high humidity, high dust, or power surges.
6. Cosmetic damage or damage to internal components caused by installation or removal, failure to follow installation or operating instructions, or any neglect or misuse of the product.
7. Any product that is returned for service with a broken tamper evident seal, indicating tampering or improper handling of the product by an unauthorized person. Violation of product tamper evident seals or modification of factory installed serial and PMA labels voids any warranty, either expressed or implied.

The FDS Technical Support team is available to provide distance troubleshooting support during business hours (8:00am to 5:00pm EST) Monday through Friday at (470) 239-7421.

Many repair requests can be resolved through distance support and may not require return of merchandise to the factory. If a product must be returned to the factory for repair, an RMA number will be issued as directed by the Technical Support team and communicated by the Repair Coordinator.

Upon request by the customer, FDS may send a Service Technician onsite to repair any non-PMA products. The travel expenses incurred to include transportation, lodging and meals along with the technician's hourly rate shall be payable by the customer in accordance with FDS' applicable rates and procedures.

FDS Avionics Corp. will, upon receipt of returned merchandise, remanufacture or replace the unit at our discretion and return the product by Ground Return Shipping. Express return shipment will be the responsibility of the sender.

This warranty is not transferable.

Any implied warranties expire at the express limited warranty expiration date. FDS shall not be held liable for any indirect, special, punitive, incidental or consequential damages.

Some states do not allow limitation on the length of an implied warranty. In such states, the exclusions or limitations of this limited warranty may not apply.





Log of Revisions

Rev	Date	Page	Description
A	07/28/2008		Initial Release
B	08/11/2008	3,11	Updated weight, changed remote control image & added chart
C	11/18/2008		Updated Installation Drawings, DB-9 Pin-outs, VGA wiring, Power & Ground wiring
D	01/29/2009	3,15	Updated specs, warranty info
E	03/27/2009	3	Updated Installation Instructions
F	04/02/2009	8	Updated DB-25 information
G	10/20/2010	12	Update Remote Control
H	01/06/2010	3	Amp Revise
I	03/23/2010	3	Current Rating Update
J	11/10/2010	9	Power Requirement Update, Format Change
K	01/21/2011		Updated Technical Drawing
L	01/21/2011		Updated Technical Drawing, Installation Instructions, Format Change, New VGA wiring drawing, New S-Video/Composite drawing, updated mounting holes
M	05/23/2015		RS485 Command Set, Warranty Info, Address Data
N	11/21/2016		All – New Spec Page, Warranty, Technical Drawing, pinouts, etc.
O	08/07/2017	ALL	New Format, New Company, New Branding, Updated VGA wiring diagram

